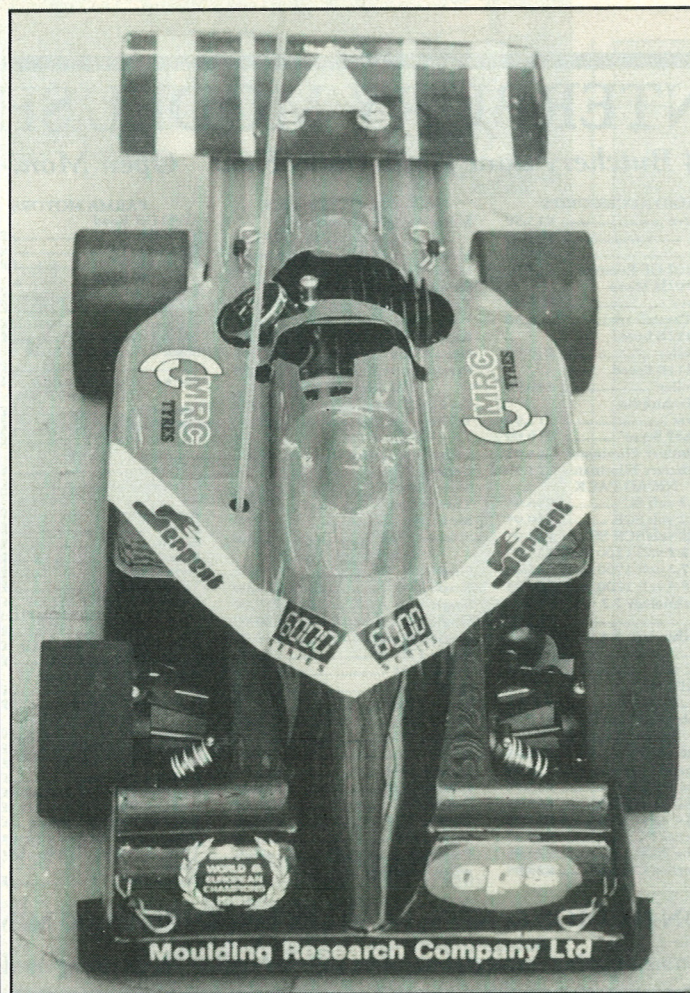


With the reputation *Serpent* have built up over the past few seasons the coming of the new "Sprint" car has to go down as one of the most eagerly-awaited events of the decade in model car racing. Indeed the first batch was sold long before the car was officially on the market. Such is the demand that dealers, model shops and customers alike have resorted to telephoning around the World to try to obtain extra supplies of the car. RCMC have built one of the very first examples of the new car to reach these shores to see how it measures up to the high expectations it has generated.

The first example we built was one of the early production models. Despite the fact that we had only an exploded diagram to act as a guide we experienced very few problems.

We were sufficiently impressed with this first example of the car to purchase a second one. This arrived in a smart waxed cardboard box that is said to act as a tyre box later. The instructions that accompanied it are quite simply the best and most professional set I have ever seen for a model car. No less than 24 pages long each step of the building process has been covered in great and brilliantly clear detail. I particularly like



any way inferior, just that it is different. In particular it is very much more adjustable and the car may be set to suit your particular driving style.

The basis of the car follows *Serpent's* familiar pattern with a one-piece aluminium alloy chassis that runs the length of the car, this time smartly anodised in black. The only fault I could find was that once again *Serpent* have seen fit not to follow the example set by other manufacturers and have not slotted the engine mount holes. I find this an extraordinary decision. Officially I am told there is no need to do so as the engine will fit straight in. This may well be the case with *Serpent's* own engine, though I notice that even the UK works drivers are using smaller washers and hexagonal headed bolts rather than the large aluminium washers and countersunk Phillips-headed screws provided in the kit. I fitted a Picco "F1" engine that we were intending to carry out a track test on. Least I have a bee in my bonnet over nothing I did attempt to fit it without reworking the holes. With the engine mounted on *Serpent Picco* blocks it was so far out that the clutch pinion did not even touch the gearwheels of the gearbox! Fortunately this time I was able to fit the engine by using smaller washers and hex bolts in conjunction with filing out the holes. On

drivers make a practice of stripping down and rebuilding their cars between the ends of the heats and the finals.

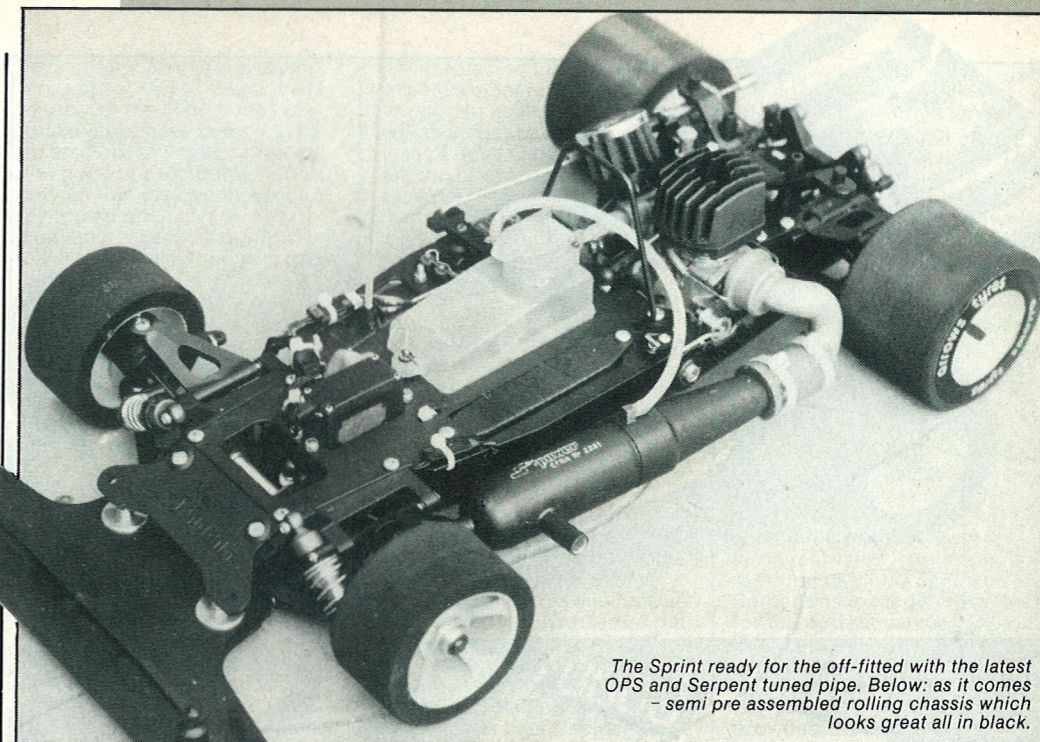
The thought that has gone into this aspect of the car is symptomatic of much of the basic design philosophy *Serpent* have employed. With the possibility of only achieving minor improvements over the handling of its predecessor they have quite rightly concentrated much of their energies on making the car one of the most practical and easy to work on eighth scale cars there has ever been. The radio plate is only the first example of this aspect of the car and we shall see many more examples of this philosophy as the review proceeds. In this respect it stands head and shoulders above its competition.

Belt-up

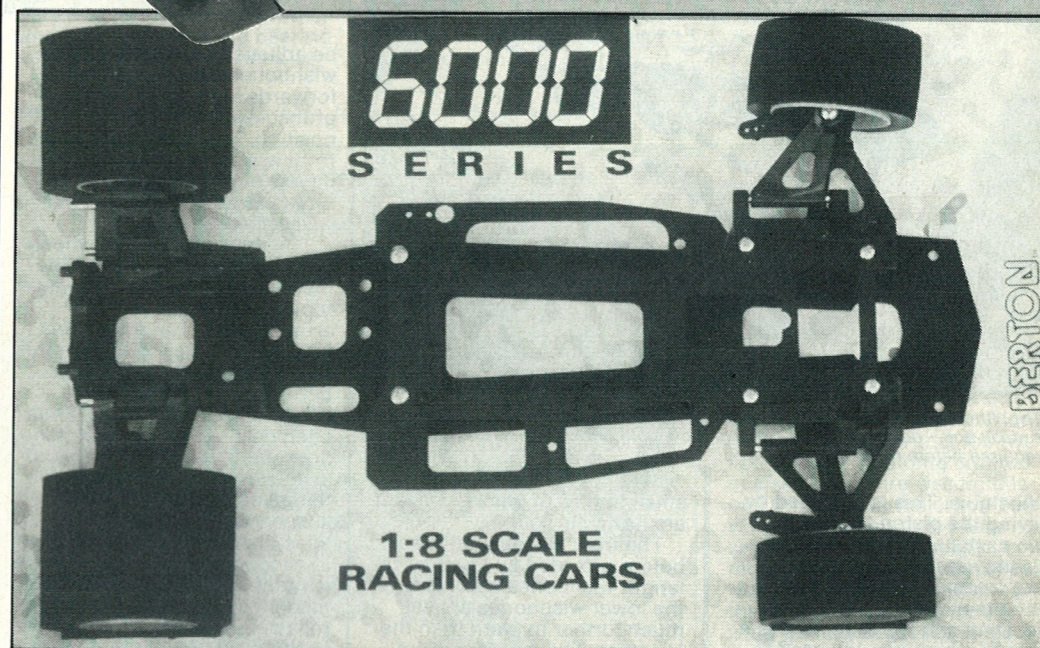
Serpent still retain the basic three-belt design that was to be found on the latter examples of the "Quattro". The belts however are now made with a more efficient round tooth form and in the interest of even greater transmission efficiency are now reinforced with Kevlar rather than steel. They are unique to *Serpent* and have been made to their own design. I must say that with the problems other manufacturers have had with Kevlar-reinforced belts I was a little worried by this change. In the event, based on the evidence of both the review car and the works cars (on which I have been keeping a careful eye), it appears that my fears were ill-founded since neither seem to have suffered any problems. Certainly one of the things that the track test has shown is that the car is appreciably quicker in a straight line. Only two types of belt are used - the rear and intermediate belts being identical.

The other notable change that has been made to the belt drive system is that the long drive belt has been moved from the right hand side of the car to the left.

Finally, before I move away from the belt drive system, there are two other points that are worthy of mention. Firstly, as yet another example of the thought that has gone into the design of this car, if the need should arise to replace the long drive belt it is an extremely simple and fast operation. All that is necessary is to remove the entire left front suspension block by removing five screws and the collet which holds the steering linkage. Even the drive cut can be left in place as the main bearing block has an oversize hole through which it may pass with the bearing being located by a suitable plastic moulding. Like I say, this car has been extraordinarily well thought out. The other end is released



The Sprint ready for the off-fitted with the latest OPS and Serpent tuned pipe. Below: as it comes - semi pre assembled rolling chassis which looks great all in black.



S.P.R.I.N.T

the way each stage has been illustrated with a general drawing of the area with the relevant components highlighted in red. Wherever it is necessary to apply oil, glue or solder etc this has been indicated by a suitable symbol. Towards the end they have included a section telling you how to get the best out of the car in terms of setting it up. At the very back they even include a chart that one may use to record the settings for different circuits. When one looks at these one can appreciate why the car has been so long coming. The effort involved in producing the instructions along, presumably in several languages, never mind the car, must have been enormous. The effort they have put in should be rewarded. I have no hesitation in saying that even if you have never built a model car before, you will have no problem building one of these. If you want to have a go at racing and are inexperienced and lacking in confidence then this package is the one for you. For the very experienced among you I would still recommend following the instructions carefully.

Having showered the instructions with praise it's nice

6000 SERIES

After the Quattro can Serpent have

created an even better chassis?

Colin Leake reveals all

to see that *Serpent* are at least human enough to make one mistake and refer to the grub screws throughout as "crubscrews".

The car itself is partly pre-assembled. This is largely done, I suspect, to increase its sales appeal so that new prospective racers are not frightened by seeing the traditional box of pieces. In practice it has to be largely disassembled before it can be fully built.

It has been said, no doubt to capitalise on the reputation of the "Quattro", that the suspension geometry of the

new car is the same as that of the old car. Whilst this may just be strictly true it is to say the least, misleading. Make no mistake with its direct-acting coil over dampers suspension system and direct-acting steering it is a very different car, and as such demands a new driving technique. The ride height of the new car is higher and the pattern of tyre wear reveals that the suspension is indeed acting differently. The front suspension on the standard kit springs is very much harder than before. The foregoing should not be taken to imply that the handling is in

previous *Serpent* cars I have actually had to mill out the countersunk section as well. Come on *Serpent* there are many drivers who for reasons of personal choice, or simply because they have good engines already to hand, will want to fit other makes of motors. How about making it easy for them?

One of the most striking ways in which the "Sprint" differs from earlier *Serpent* cars is that all the running gear is located on the chassis. This means that to remove the radio plate all that is necessary is to break the fuel and pressure pipes, throttle, brake and steering linkages, disconnect one end of the rear brace, take out the roll-over bar and remove six screws. All of this can be accomplished in a few minutes and makes working on the car both after and during meetings very simple and quick. A feature this which to the uninitiated may seem trivial, but will be much appreciated by seasoned eighth scale drivers who are very much aware of the need to strip their cars down overnight at a three-day meeting to ensure that they are adequately prepared for the following day. Indeed many Open and A Final

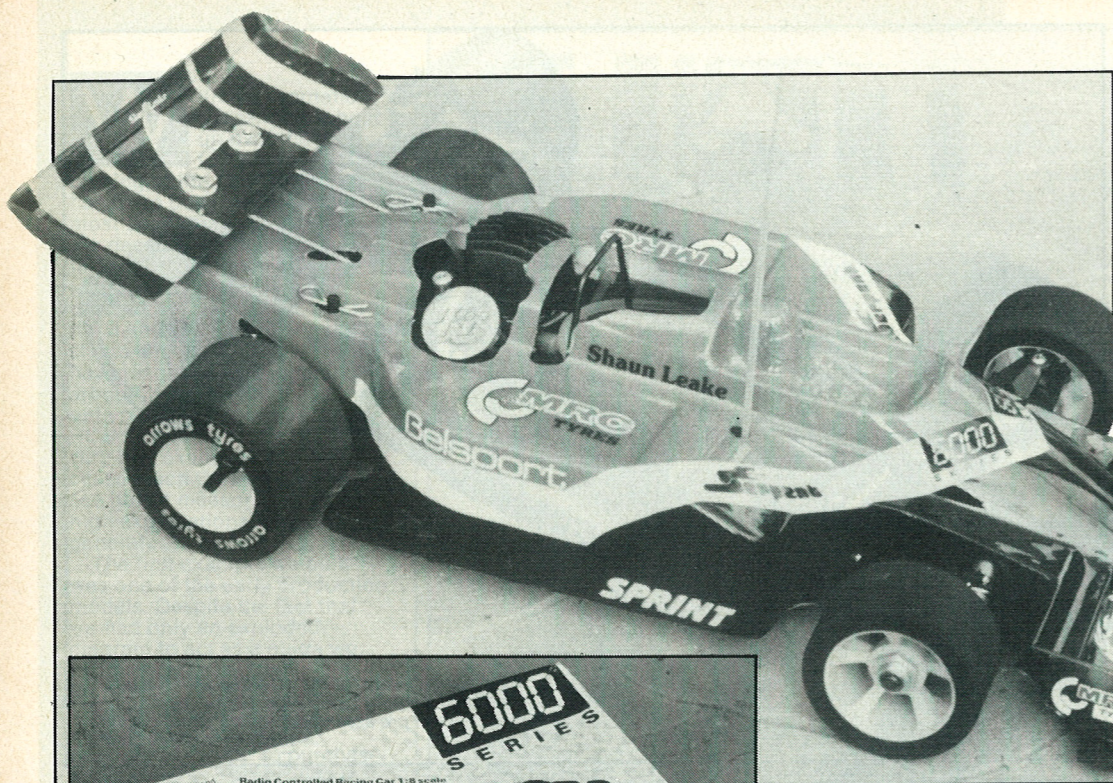
by removing the outer drive sprocket carrier and slackening the locating grub screw of the inner one so that the intermediate lay shaft may be moved to one side. Secondly the previously totally useless belt tensioner that was provided on the "Quattro" has thankfully been replaced by a simple, yet clever effective spring-loaded device. At first I breathed a sigh of relief when I say this in the assumption that it would work superbly well. In the event for reasons beyond me there does seem to be a minor problem in this area which I will deal with later.

The suspension is now provided by coil springs acting over the damper units. The spring pressure may be adjusted by a collar that clamps to the outside of the damper cylinders. These cylinders have a fine thread

running down them to prevent the collars slipping. The dampers themselves have been repositioned so that they now act directly on the outer ends of the lower wishbones. The springs are conventional enough. At first I thought the kit springs were a little too stiff, but the car seems to handle fine on them and I notice that the UK works drivers are using them, so one can only conclude that *Serpent* have got it right. So far the cars have only been run in the UK on the smoother tracks so we have yet to see how their relatively stiff suspension will cope with the smaller rougher tracks. There should be no problem beyond sorting out what works best on those tracks as alternative springs are available.

The dampers themselves are entirely new and very cleverly designed. No doubt in the

interest of keeping the unsprung weight to a minimum the damper rods are fixed to the suspension arms, which means that the seals are located facing downwards. To mount dampers this way up one has to be very confident of the shaft seals or all the oil will very quickly be lost. *Serpent* have taken care of this aspect by using two silicon rubber "O" rings. These seem to provide a totally effective seal whilst at the same time ensuring that the shaft does not bind. Unlike previous *Serpent* dampers the new ones are not of a constant volume design. The oil displacement that is necessary to allow for the piston rods when they are pushed inwards is provided for by small rubber diaphragms at the closed end of the units. Before we leave the dampers we come to their *pièce de résistance*. They are



to understand by the gentleman who made the last batch that by the time this is in print he will have produced some to suit the new car.

The anti-roll system, at the front follows previous practice. Two thin spring steel wires have one end located firmly in each lower wishbone with the free ends joined together in the middle by a ball and cup arrangement.

The body posts at the front for Saloon and GT and now carried on a neat little plate that also serves to help tie the front suspension blocks together. The wheels themselves both front and rear are entirely new. Previous *Serpent* wheels had a six-sided drive recess arrangement that had to be perfectly aligned before the wheel could be put on. The new ones have a system of

taking up the drive that can best be compared to the relationship of a socket spanner to a nut. In effect the wheel has now become virtually self aligning. Whilst moulding the new wheels *Serpent* have taken the opportunity to make sure that both are a perfect fit on the shafts. No more should we have problems with wheels sticking on.

Moving backwards we come to the steering servo. *Serpent* have designed their own "Kimbros" type servo saver that fits directly on the servo. *Serpent* would have done better to have bought the excellent *Kimbros* original which their new one is based. Firstly it has the splines moulded-in, which seems to mean that the fit on various servos is somewhat of a compromise. It fitted easily enough onto our *JR* servos but was an alarmingly tight fit on the *Futaba* ones. Having the splines moulded in means that it is also misses out in that it is not possible to adjust its position on the servo by half a spline by repositioning the insert. I put it on a servo and felt the resistance, concluded that it was too stiff for my liking and replace it with a *Kimbros*.

Still moving towards the rear of the car the fuel tank is unchanged.

The bearings for the intermediate layshaft are now located in plastic blocks. These are self locating so it is no longer necessary to carefully line these up to ensure efficient transmission. The rather complicated formed roll over bar is located in these blocks.

The radio tray is braced to the rear power pod with a metal tie-rod. If a *Picco* or *Nova Rossi* engine is used then it is necessary to reposition the balljoint on the radio tray and bend the rod since there is not

be adjusted by sliding the top wishbones backwards and forwards along their pivots. A grub screw locks them in position. The ride height at the front is also adjustable by means of grub screws that any on the inner end of the lower wishbones.

The drive to the front wheels is by revised drive shafts. The inboard hexdrive has now been replaced by a ball and pin arrangement. The Americans have a lovely description of this type of shaft. They call them dog-bones which seems to describe them perfectly. It has been held in the past that this arrangement is not as efficient as hexdrives. In fact when one thing of the very limited suspension movement that takes place on a circuit car the likelihood is that in reality there is nothing in it. Certainly if well made they are potentially more reliable and are not susceptible to the gradual wear that takes place on hexdrives leading to eventual rounding off at the least expected and appropriate moment. I like the fact that since gaiters are no longer needed it is easy and quick to inspect the condition of the drive shafts.

As before the one-way bearings are still carried outboard in aluminium carriers. These look like those used in the "Quattro" but in fact the diameter of the hole in the centre of the front wheel has been increased slightly so that the wall thickness of the aluminium is significantly increased. It is now possible to tighten the wheel nuts up good and tight without breaking the carrier. The wheels are held in place with a simple aluminium wheel nut. The aluminium cap nuts that most UK drivers used to keep dirt out of the one-way bearings will of course no longer fit, but I have been given

small bottles of damper oil that are normally sold.

The front suspension is as before provided by unequal length wishbones but this time the lower wishbones are set much further forward than the top ones. The mouldings are aerodynamically shaped. They do look as if they may be a little frail, but this is not the case. They are, if one thinks about it, very strong in the horizontal direction and hence able to take any knocks they may receive during racing. So far this has been borne out in practice. One of the results of their new positioning is that no positive steering stop is provided. Based on the experience we had previously had with the earlier *Associated Cars* (which now I must add do incorporate steering stops), I was a little worried that this might lead at best to a rash of displaced drive shafts or at worst broken ones. In fact the *Serpent* drive shafts are quite massive affairs and very securely located and my fears have not been realised either in our cars or those of other drivers.

The castor at the front may



Top: fitted with *Serpent* FI bodyshell the *Sprint* looks the part. Above: quite a small box - on opening the car is half built although a rebuild is really required before running.

adjustable. This is achieved by having the piston formed by two castellated cone-shaped plastic mouldings with an "O" ring trapped between them. The inner cone is a free fit on the shaft and the outer one is a tight fit which moulds itself to the tread of the shaft. To adjust the degree of damping, all that is necessary is to push the damper fully in so that the outer castellated cone engages with a plastic moulding that is trapped in the end of the cylinder. Turning the rod clockwise moves the outer cone nearer the inner one squeezing the "O" ring out towards the cylinder wall thus reducing the gap the oil has to pass through and increasing the damping effect.

Since the dampers are adjustable it is possible to use almost any suitable damper oil in them. I used some of the synthetic oil normally used to make up the engine fuel. This makes fine damper oil. It holds its viscosity well, does not readily foam, is super slippery yet because it is not very penetrating does not tend to leak out of the seals. It works out much cheaper than the

room for it to pass between the engine cylinder and the carburettor. With *Serpent* or *OPS* engines it can be fitted as supplied.

The clutch and gearbox arrangement is now to my mind the best available. Ideally one should have an engine with a *Serpent*-type crankshaft. If this is the case the flywheel is fixed to the crank over a special tapered cone and held firmly down by a simple nut. For those who do not have such a crankshaft *Serpent* manufacture an adaptor to hold the flywheel on and provide the mounting for the rest of the gearbox. The flywheel itself is very slim and features a unique shroud that projects from the back to throw any oil that may come out of the engine's front bearings clear of the brake discs. It's yet another example of the thought that has gone into this car, though I have heard that the provision of this particular feature has something to do with the fact that *Serpent*'s own engine is said to have a distinct tendency to throw oil out of this bearing.

As before *Serpent* use three clutch shoes made from a carbon-impregnated PTFE material. These shoes are however slimmer than those used in the "Quattro" and drivers should accordingly resist the temptation to lighten them as much as they would have the old ones. This time the shoes are held in place by a thin steel washer that fits over the end of the pins, thus not only holding the shoes in place but effectively stabilising the pins as well. This washer is held in place with a slim nut. I found it necessary to grind off the ends of the pins to prevent them fouling the clutch-bell.

To the first car I was fitting a *Picco* motor with an old-type SG crank. To do this I had to cut off the end of the crank and use the adaptor supplied with the kit. Because the plain ground area of the shaft was too long for the nut to go down far enough to lock the flywheel on I had to carefully grind some of it away with a dremmel. Doing so was a mild inconvenience but presented no real problem.

The clutch bell runs on three ball bearings. I have always had my reservations about the size of the outer two but have to admit that over the years we have run *Serpent* cars they have never proved to be much of a problem. The clutch bell is retained in place by a capbolt that screws directly into the end of the crank-shaft or adaptor.

A wide variety of clutch bells and two sets of main gears are available to give a selection of gear ratios that should cover any track that is likely to be encountered.

Moving to the very back of the car we come to the rear assembly. Two main bearing housings form the basis on which everything is hung. *Serpent* use the traditional rear

layshaft to carry the gearbox drive sprockets and two brake disks. On the 6000 Series the brake disks have been moved to an inboard position, hence the need to protect them from any oil that may be thrown out by the engine. Just on the subject of brake discs, *Serpent* have reverted on this car to the old type of disk. Do not be tempted to fit the new type of disks in the belief that *Serpent* were just taking the opportunity to use up stocks of the old type. The new type are being dropped as it appears they have a tendency to bind if used on the 6000 Series.

The gearbox is much as before in terms of the way in which it operates, it has however been made slightly slimmer to reduce the over-hung loads on the engine. One of the problems of the earlier gearbox was that it relied on a one-way bearing for its operation. This bearing was needed to say highly stressed. To make matters worse such bearings are very critical pieces of engineering and work on very fine tolerances. Any water and dirt that enters the bearing very dramatically shortens its

life. Replacing the relatively expensive bearing is bad enough in itself, but what is worse is that the sudden total loss of drive can cause the engine to over-rev and, as recent experience has taught me, result in a very hefty repair bill for the engine. To prolong the life of these bearings, especially in the wet, *Serpent* now provide a plastic cap that snaps firmly in place on the end of the bearing carrier to prevent the ingress of water and dirt. So far this seems to be having the desired effect, and the cars can now be raced in the wet without having to remove the gearbox with impunity.

Drive to the rear is as already mentioned by a belt. This drives directly onto a sprocket formed as part of *Serpent*'s well-proven limited slip type ball differential. Apart from the belt drive sprocket the only difference between this diff and that used previously is that the split cotter that locks the diff in position has been replaced with a solid one that is locked in place by a grub screw which acts on a nylon pressure pad which in turn acts on the

thread.

The rear suspension is provided by unequal length wishbones and direct acting spring over damper units. The ride height is normally much higher than most of us have been used to previously (which means the tyres can be worn down lower). *Serpent* suggest that in high traction conditions it may be necessary to lower the rear ride height to prevent the car rolling over. Should this prove necessary they suggest using shorter rear springs be used in preference to using smaller rear tyres. When testing the car even in high traction conditions at Crystal Palace we did not find this to be a problem. Our car behaved splendidly on both small and large rear tyres. However if the rear ride height is lowered *Serpent* have made provision for the correct camber angle to be retained by turning the rear uprights upside down.

A simple yet effective "U"-shaped anti-roll bar is provided at the rear. I did notice that one of the works drivers was experimenting with different thickness bars but as he now seems to have gone back to the kit bar one must assume that his experiments were unsuccessful.

Serpent have retained their totally successful quick release rear wheel mechanism, with the added advantage that the wheels are virtually self aligning. This simple and cost effective arrangement must be one of the best there is.

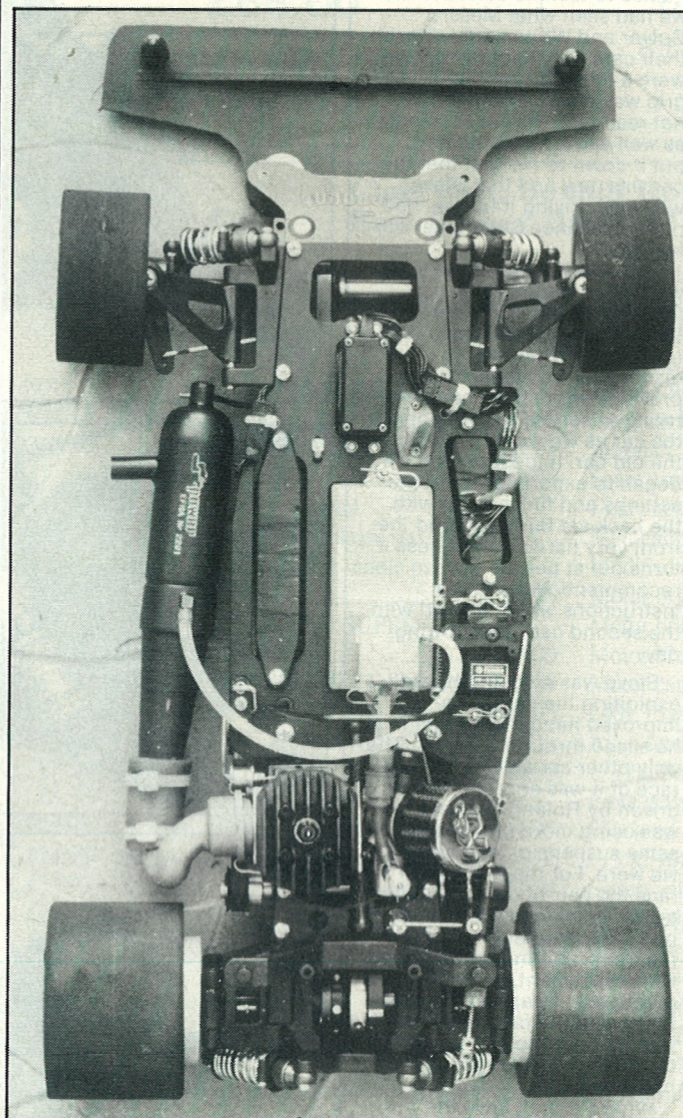
The wing wire locates in two holes moulded into a special bracket that is screwed across the bearing blocks. No means is provided to secure the wire in the holes other than friction. I found on our car that the two holes in the moulding differed in size so the wire was tight in one but slack in the other. The wing is attached to the wire by small aerodynamic plastic mouldings. We found that it was not possible to tighten these up enough to stop the wing getting displaced in the event of an accident since beyond a certain point any further tightening simply distorted the plastic.

Ready to run

The complete car, ready to run with worn tyres and a light body, just creeps over the EFRA and BRCA weight limits. In our case we were using a lightweight *Futaba* receiver and a standard 5-cell battery pack.

As yet another indication of how determine *Serpent* are to succeed with this car it was interesting to find that when building the second car any small problems we had encountered such as tight suspension pivots and a tight-fitting bumper had been eradicated. Quite obviously *Serpent* had been through that first batch of cars with the proverbial fine tooth comb before launching the first proper production batch.

Neat layout adds to the car's looks. Note coil over shocks all round.



Building tips

Largely as a result of the above and the extremely competent nature of the instructions there is little I can pass on by way of tips on building the car.

On the first can I did need to ease a couple of the suspension point holes. I was horrified recently when the reviewer of the *PB* "Phoenix" in a rival magazine recommended enlarging these with a file! Don't do it. If you do there is no way you will get a round or parallel hole and while you may appear to have initially got a good fit you will find that play will quickly develop when the car is raced. A small, suitably-sized reamer is the best answer, or failing that, a new sharp drill bit. Try one the same size as the shaft first and if that does not work use one 0.1mm larger.

Some drivers, including us have experienced problems with the small plastic idler wheel on the belt tensioner melting, despite ensuring that it was lubricated and under only light pressure. To be fair many drivers have experienced no such problem. I am at a loss to see why this should be so. As a precaution to prevent any possible recurrence of the problem I drilled the spare idler out and ball raced it. As I have a lathe I turned a small brass carrier for the inner races and soldered that onto the wire. If you do not have a lathe then purchase a length of suitably-sized brass (most model shops will stock it) and solder that to the wire instead.

The front wheel nuts have a tendency to work loose. The simple solution is to wind two layers of PTFE plumber's tape around the threads before putting the nuts on.

When assembling the dampers be very careful to align the second cone on the thread properly. It is all too easy to damage this. The little membrane that goes in the top to take up the oil displacement of the piston rod is very fragile and is easily damaged. If you follow the practice employed on the previous dampers and wind the end down tight you will damage this membrane. A quick trackside survey of London Club members revealed that most of us have already done this and are using more robust alternatives. We are using caps marketed by *SRM*, originally intended for use in *Kyosho* shocks. Some other drivers are using *Tamiya* caps.

The new screws that *Serpent* provide for the F1 body post are too easily pulled out. I suggest like us you revert to the old large self-tappers they used to use.

The grub screws that lock the front drive cups onto the layshaft just foul the plastic holes in the bearing blocks. Either grind the protruding bit off or slightly enlarge the holes they pass through.

To reduce wear on the centre of the brake discs and lessen the change of one disintegrating run a little thin superglue into the edge. Once you have done this just rub the face of the discs over a flat, well-supported sheet of fine sandpaper to ensure there are no protrusions at the edge which may cause uneven braking.

Running tips

The first and most obvious one is to follow the advice given by Roddy Roem on setting the car up in the instructions.

The only other tip that comes to mind is to check the roots of the teeth on the drive sprockets and clean them out regularly. They seem very prone to collecting dirt which can become compacted in. On one occasion one of ours even managed to get two small stones wedged in it. To check that this has not happened release the brake between races and gently push the car forwards. If the resistance increases sharply at any point look for a stone.

On the track

Our expectations were high when we set out for Crystal Palace to test the car. After all we had seen what Messrs Culver and White could do with their cars. On that first day we were a little disappointed. The grip was down and we could not really get the car to handle as well as we had expected. I put it down to the fact that the car was new and that Steve, who was driving it for me, had not raced since September of last year.

Our second visit to the track was for a London Club meeting. With FTD and a win in the A Final it was more rewarding. When we discovered that in the previous session we had been trying to set the suspension of the car as we would have done the old car. In desperation we began to experiment with the settings and finished up with the back set fairly soft and the front very hard. More or less it turns out at per the recommendations in the instructions which arrived with the second car the following day.

Steve was enjoying himself exploiting the car's now-improved handling to the full as he sliced through the field. The only other car able to make a race of it was another "Sprint" driven by Roland Leonard, who was using more or less the same suspension settings as we were. For the first half of the race the pair of them virtually put on a demonstration that had the kids watching around the track jumping up and down with excitement, as they continually swapped the lead. In the end the fact that Roland was trying to do two weekends on one set of tyres proved to be his undoing.

What's more I have the

feeling that we have only begun to explore the car's potential. Having got it to a point where it could win we were reluctant to experiment any further at a race meeting. Once we have had more time on the track to experiment I feel sure we shall be able to improve further on the car's already impressive performance.

A little advice from the ever-helpful and patient works drivers Steve White and Gary Culver will no doubt produce further improvements as well.

We have not had the chance to try the car in the wet yet, but it has already won two major races under these conditions, shod with the seemingly mandatory *MRC* tyres, so there is no reason to suspect that any problems will be encountered.

Conclusions

If I've run on a bit in the rest of the review I'll make amends by keeping the closing comments short. What, after all can one say? It's reasonable prices, fast, sweet handling,

reliable, easy to work on and easy to build. In essence, with the exception of a very few minor details, that *Serpent* can easily fix if they've a mind to, it's as near as one can ever expect to come to the ideal eighth scale circuit car.

One can see why it has taken so long to develop. In the past I've said some harsh things about the non-availability of the car and the decision to launch it in the middle of the European season, mainly borne out of frustration at not being able to obtain what was widely expected to be a good car. That being the case it is only fitting that I should conclude by congratulating *Serpent* on designing, and bringing to the market a brilliant car, that represents a very real step forward in the annals of Model Racing Car design.



Below: Serpent tried and tested two-speed gearbox is included in the kit. Centre: short front coil over shocks sit at 45 degrees. Bottom: rear end is very neat and uses Serpent's smooth aluminium dampers.

